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19 August 1957

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HOT AIR BALLOON STEERING COMMITTEE MEETING, AUGUST 19, 1957

Present:

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This meeting of the Hot Air Balloon Steering Committee was held to discuss progress made to date along the following lines of endeavor:

- a. Experimental testing of 7 ft. TT balloons for determination of film configuration yielding minimum overall heat transfer.
- b. Investigation of materials having increased temperature resistance as compared to polyethylene.
- c. Development of a burner suited to the space and heating requirements of the system.
- d. Development of a compact, lightweight, direct reading temperature measuring system with the sensing element mounted at the apex of the balloon.

Thus far, "U" values have been determined experimentally for single wall poly balloons with plain, internally metallized and externally metallized film and for double wall poly balloons with plain film. With Δt in the range 145-155°F. (average internal balloon temperature 220-230°F.) and unit lift in the range .0150-.0155 lb/ft.³, the resulting "U" values are:

	<u>U (BTU./hr.-ft.²-°F.)</u>
Single wall - plain	1.56
" - internally metallized	1.07
" - externally metallized	1.09
" - double baffle	1.60
Double wall - plain (95% wall separation)	1.07
" - plain (perforated 3 ft. down from apex)	1.51

These tabulated "U" values must be taken as relative rather than absolute since ventilation loss is not taken into account in arriving at these numbers.

It should be stated that the last value (1.51) was obtained with poor wall separation; effectively an estimated 80-90% of the surface was acting as a single wall balloon. Further testing will continue to obtain a "U" value for a double wall balloon with an internally metallized inner film and a plain outer film.

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As for the materials investigation phase, Plant 1 has contacted several film manufacturers among them DuPont and Dobeckman, and have requested specifications, price and samples of such films as Armalon, Urethane foam and Teflon. To date no replies have been received, however, they are expected in the near future. Aralon is a glass coated fabric available in metallized laminated form and has been known to resist a temperature of 700°F. for 24 hours. Urethane foam is available in the form of a heat sealable film and has temperature characteristics up to 450°F. Teflon is temperature resistant to about 600°F and more information on films, laminates and improved heat sealing methods has been requested.

A redesign of the 200 ft.³/hr. Buzzer burner incorporating a right angle burner head and with 150 ft.³/hr. gas rate has been completed, the idea being to place two of these burners side by side with the venturi mixing chamber in a horizontal position. Further progress on the burner has been halted pending development of a satisfactory balloon design.

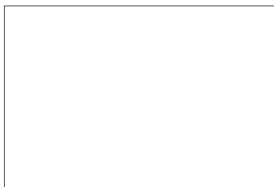
Several temperature monitoring systems have been looked into, however, a maximum weight of approximately three pounds has been arbitrarily established and this has ruled out most possibilities. Information has been requested for a direct reading indicating pyrometer made by Assembly Products, Inc. of Chesterland, Ohio. Models with various ranges are available with a full scale deflection of 300°F. and a full scale accuracy of 2%. These units are thermistor compensated for ambient temperature changes.

The plan for the immediate future is to:

- a. Continue heat loss tests on a double wall internally metallized inner and plain poly outer balloon.
- b. Run temperature, strength and sealability tests on new materials, some of these tests to include melting of 7 ft. balloons.
- c. Investigate a temperature monitoring system with maximum effort being expended on items "a" and "b".

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